DOCKET NO. 0140-4126 PATENT

UNITED STATES PATENT APPLICATION

of

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FOR

SOAK ON SITE AND SOAK ON PRESS CLEANING SYSTEM AND METHOD OF USING SAME

FIELD OF THE INVENTION

This invention relates to a cleaning system employing a strip of cleaning fabric wrapped around a core or a shaft to form a cleaning fabric supply roll. The strip of cleaning fabric is soaked at the site prior to use or is soaked on the press.

BACKGROUND OF THE INVENTION

A wide variety of blanket cleaning systems and apparatus employing the same to clean the cylinders of printing presses are known. Typical blanket cleaning systems and apparatus employing the same, including cleaning blankets and cleaning solutions, are exemplified by U.S. Patent No. 4,135,448 to Moestue which is directed to a mechanism for cleaning a cylinder that is provided with a cleaning cloth which is wetted with a cleaning fluid or solution prior to its encountering the pressure roller; U.S. Patent No. 4,934,391 to Futch et al. is

directed to a composition for ink removal that exhibits a low vapor pressure and which is a low vapor pressure organic compound; U.S. Patent No. 4,986,182 to Sawaguchi et al. is directed to a cleaning apparatus in which a cleaning cloth is dampened by a liquid; U.S. Patent No. 5,009,716 to Gerson is directed to a wash for removing ink comprising a low volatile organic compound; U.S. Patent No. 5,012,739 to Loos is directed to a washing device comprising a cleaning cloth dampened with a washing medium and U.S. Patent No. 5,069,128 to Hara is directed to a device for cleaning a cylinder of a printing machine comprising a cleaning cloth impregnated with a cleaning liquid.

In addition, U.S. Patent No. 5,104,567 to Staehr is directed to a liquid for cleaning ink from printing machines; U.S. Patent No. 5,125,342 to Hara is directed to a method for cleaning the cylinder of a printing machine; and U.S. Patent No. 5,143,639 to Krawack is directed to a cloth moistened with a low vapor pressure cleaning agent for removing ink; whereas U.S. Patent No. 5,188,754 to Weltman et al. is directed to a cloth soaked with a cleaning formula and U.S. Patent No. 5,194,173 to Folkard et al. is directed to a method for removing ink from printing machines. Still further, U.S. Patent No. 4,344,361 and 4,757,763 to MacPhee et al. is directed to automatic blanket cylinder cleaners provided with cleaner fabrics adapted to contact the blanket cylinders of printing presses. On the other hand, U.S. Patent No. 5,175,080 to Gasparrini et al. is directed

to a cloth supply system for the blanket cylinder for use in printing presses.

While the above-mentioned patents accomplish their purposes to a satisfactory extent, they still exhibit a variety of drawbacks. For example, they usually require apparatus, such as pumps, spray bars, manifold lines, valves, and the like as part of the automatic blanket cleaning systems for introducing the cleaning solvents or solutions to the cleaning fabric just prior to actual use.

U.S. Patent No. 5,368,157 to Gasparrini et al., the present applicants, attempted to overcome these problems. That patent is directed to a pre-packaged, pre-soaked cleaning system for use with printing machines or the like to clean the cylinders of such machines and which comprises a pre-soaked fabric roll saturated to equilibrium with low volatility organic compound solvent and which is disposed around an elongated, cylindrical core and a sealed or a shrunken and sealed plastic sleeve disposed around and in contact with the fabric roll, whereby the pre-soaked saturated roll can be transported and stored vertically and/or horizontally until use without substantially disturbing the distribution of the solvent in the fabric roll and detrimentally effecting the cleaning ability of the fabric.

While the invention disclosed in U.S. Patent No. 5,368,157 works for its intended purpose, improvements have been discovered. When the patented product is placed in the vertical

position, the solvent would shift downward in the evacuated package. When the package is restored to the horizontal position, the solvent migrates back towards equilibrium in the roll. This migration is caused by air pockets in the fabric of the roll.

There exists, therefore, a need for providing a blanket cleaning system which improves upon the above-mentioned conditions. The present invention fulfills such a need.

OBJECTS OF THE INVENTION

It is therefore an object of the invention to provide a new and improved system for soaking a strip of cleaning fabric for use in a cylinder cleaning system.

It is a further object of the invention to provide a new and improved system for soaking a strip of cleaning fabric which overcomes the drawbacks discussed above.

Another object of the invention is to provide a new and improved method in which a strip of cleaning fabric is presoaked on the same site as the press or in proximity to the press in which it is to be used to allow transportation of the presoaked cleaning fabric supply roll to the press without substantially disturbing the distribution of the solvent in the cleaning fabric supply roll and detrimentally affecting the cleaning ability of the fabric.

Another object of the invention is to provide a new and

improved system in which a strip of cleaning fabric is soaked and saturated to functional equilibrium with a low volatility, organic compound solvent after it is unwound from a bulk roll but before it is wound into a cleaning fabric supply roll on a core or shaft.

Another object of the invention is to provide a new and improved method of soaking a strip of cleaning fabric on a cylinder cleaning apparatus while located on a press.

A yet another object of the invention is to provide a new and improved method of soaking a strip of cleaning fabric on a press while the strip of cleaning fabric is still wound in a cleaning fabric supply roll on a core or shaft.

A still further an object of the invention is to provide a new and improved method including the use of an adjustable means to remove excess solvent from the strip of cleaning fabric to control the amount of solvent retained by the strip of cleaning fabric.

A further object of the invention is to provide a new and improved soak on press system in which a single roller is used to both soak and saturate the strip of cleaning fabric in solvent and to remove excess solvent for the strip of cleaning fabric.

The foregoing specific objects and advantages of the invention are illustrative of those which can be achieved by the present invention and are not intended to be exhaustive or

limiting of the possible advantages which may be realized. Thus, these and other objects and advantages of the invention will be apparent from the description herein or can be learned from practicing the invention, both as embodied herein or as modified in view of any variations which may be apparent to those of ordinary skill in the art, the same being realized and attained by means of parts, constructions, instrumentations and combinations pointed out in the claims. The present invention resides in the novel parts, constructions, arrangements, combinations, methods and improvements herein shown and described.

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided a method of cleaning a cylinder of a printing press using a soak on press system comprising first placing a cleaning fabric supply roll having a strip of cleaning fabric in a cylinder cleaning system. Second, the strip of cleaning fabric is brought in contact with a low volatility, organic compound solvent or cleaning agent which does not evaporate readily at ambient temperature and pressure and soaking and saturating the strip of cleaning fabric with the solvent or cleaning agent. The soaking and saturating may occur while the strip of cleaning fabric is part of the cleaning fabric supply roll or after it has been unwound from the cleaning fabric supply roll. An optional third

step is removing any excess solvent or cleaning agent from the strip of cleaning fabric to obtain a strip of cleaning fabric saturated to functional equilibrium. Fourth, the strip of cleaning fabric is used to clean a cylinder.

In a more specific aspect of the method, the used strip of cleaning fabric is wound up on a take-up roll.

In still another more specific aspect of the method, at least a portion of the cleaning fabric supply roll is dipped in a container containing the solvent. The rotation of the cleaning fabric supply roll preferably causes the entire cleaning fabric supply roll to be soaked and saturated with solvent.

In yet another aspect of the method, the strip of cleaning fabric is unwound from the cleaning fabric supply roll prior to being brought in contact with the solvent. In a preferred method of this aspect, the strip of cleaning fabric is brought in contact with the solvent by means of a dipping roller.

In another more specific aspect of the method, the excess solvent is removed by squeezing the strip of cleaning fabric, preferably by using a squeezing roller or rollers. In a more specific embodiment of the method, the roller used for dipping the strip of cleaning fabric is the same roller as that used for squeezing the strip of cleaning fabric. In another embodiment, the location of the squeezing roller(s) are adjustable to control the amount of solvent in the strip of cleaning fabric.

The invention also includes a soak on press assembly for use in a printing press cylinder cleaning system. The assembly comprises a mounting assembly affixed to a printing press. A cleaning fabric supply roll including a strip of cleaning fabric is rotatably mounted to the mounting assembly. Soaking means are used for soaking and saturating at least a portion of the strip of cleaning fabric with a low volatility, organic compound solvent which does not readily evaporate at ambient temperature and pressure and removal means used for removing excess solvent so that the strip of cleaning fabric is saturated to functional equilibrium with the solvent or cleaning agent. A cylinder cleaning means is used for bringing the strip of cleaning fabric into contact with a cylinder to be cleaned to clean the cylinder and the used strip of cleaning fabric is collected by a take-up means.

In another more specific embodiment, the soaking means contacts the strip of cleaning fabric to the solvent prior to its removal from the cleaning fabric supply roll.

In an alternate embodiment, the soaking means includes a roller means for placing the strip of cleaning fabric into said solvent to soak and saturate the strip of cleaning fabric. In a further more specific embodiment the removal means includes a squeezing means for squeezing excess solvent and, in one embodiment, said squeezing means and said roller means are a unitary structure.

The invention also comprises a soak on press assembly including a mounting assembly affixed to the printing press to support the soak on press assembly. A cleaning fabric supply roll including a strip of cleaning fabric is rotatably mounted on the mounting assembly. A low volatility, organic compound solvent which does not readily evaporate at ambient temperature and pressure is placed in a container in engagement with the mounting assembly and at least a portion of the cleaning cloth supply roll is placed within the solvent to soak and saturate the strip of cleaning fabric. At least one squeezing roller is operatively associated with the strip of cleaning fabric to removing excess solvent from the strip of cleaning fabric to obtain a strip of cleaning fabric saturated to functional equilibrium with solvent. Preferably, at least one roller is operatively associated with and in a movedly fixed relationship with a surface of the container for removing excess solvent from the strip of cleaning fabric by squeezing it between the squeezing roller and the side of the container.

An alternate embodiment of the invention may also comprise a mounting assembly affixed to said printing press for supporting the soak on press assembly. A cleaning fabric supply roll including a strip of cleaning fabric is rotatably mounted on the mounting assembly. A low volatility, organic compound solvent which does not readily evaporate at ambient temperature and pressure located in at least one container engaged with the

mounting assembly. A dipper is at least partially submersed in the solvent. The strip of cleaning fabric is adjacent the dipper so that the strip of cleaning fabric is soaked and saturated with the solvent. The strip of cleaning fabric is located in a gap between, and in contact with, a surface of the container and a squeezer so that the strip of cleaning fabric is squeezed and the excess solvent removed and placed in the container and the strip of cleaning fabric is placed in functional equilibrium. A cylinder cleaning means is used for bringing the saturated to functional equilibrium strip of cleaning fabric into contact with a cylinder to be cleaned and the cleaning apparatus. A take-up means is used for collecting the used strip of cleaning fabric.

In a more specific embodiment, a single container is used to store the solvent. In such an embodiment, the dipper and the squeezer may both be the same roller. In a different embodiment, the dipper and/or the squeezer are individual rollers.

The invention also includes a method for presoaking a strip of cleaning fabric on site. Broadly, the method includes contacting a strip of cleaning fabric with a low volatility, organic compound solvent which does not readily evaporate at ambient temperature and pressure and soaking and saturating the strip of cleaning fabric with the solvent. The strip of cleaning fabric is wrapped on a core or shaft to form a cleaning fabric supply roll. The cleaning fabric supply roll is engaged with a

printing press having a cylinder to be cleaned without disposing a sealed plastic sleeve about the fabric roll and without substantially disturbing the distribution of the solvent in the cleaning fabric supply roll and detrimentally affecting the cleaning ability of the strip of fabric.

Preferably, after contacting the strip of cleaning fabric to the solvent, the strip of cleaning fabric is saturated to functional equilibrium. The preferred method of achieving this result is measured absorption of the solvent. Alternatively, excess solvent may be removed from the saturated strip of cleaning fabric.

In another embodiment of a method for soaking a strip of cleaning fabric, a strip of cleaning fabric is unwound from a bulk roll. A low volatility, organic compound solvent which does not readily evaporate at ambient pressure and temperature is applied to at least one roller. The unwound strip of cleaning fabric is brought in contact with at least one roller to soak and saturate the strip of cleaning fabric with solvent. Preferably, the strip of cleaning fabric is saturated to functional equilibrium with the solvent. The soaked and saturated strip of cleaning fabric is wound on a core or directly on a shaft to form a cleaning fabric supply roll.

It will be appreciated by those skilled in the art that the foregoing summary of the invention and the following detailed description are merely exemplary and explanatory of the present

invention, but are not intended to be restrictive thereof or limiting of the advantages which can be achieved by the invention or various combinations thereof. The accompanying drawings referred to herein and constituting in part hereof, illustrate preferred embodiments of the invention and, together with the detailed description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention more fully, reference is directed to the accompanying drawings, which is to be taken in conjunction with the following description of the invention and in which drawing:

FIG. 1A is a lateral, sectional, elevational view of a cleaning fabric supply roll formed around a core;

FIG. 1B is a lateral, sectional, elevational view of a cleaning fabric supply roll formed around a shaft;

FIG. 2 is a cross-sectional view of a soak on press assembly according to the present invention including soaking the cleaning fabric supply roll in solvent;

FIG. 3 is a cross-sectional view of a soak on press assembly according to the present invention including a single duct or container for storing solvent;

FIG. 4 is a cross-sectional view of a soak on press assembly according to the present invention including separate

ducts for storing solvent to be applied and removed excess solvent;

FIG. 5 is a cross-sectional view of a soak on press assembly according to the present invention including a single roller to dip and squeeze the strip of cleaning fabric;

FIG. 6 is a cross-sectional view of a soak on site system according to the present invention;

FIG. 7 is a cross-sectional view of an alternate embodiment of a soak on site system according to the present invention including separate rollers for applying solvent and removing excess solvent;

FIG 7A is a cross-sectional view of an alternate embodiment of a soak on site system according to the present invention in which a same roller is used to both apply and remove solvent; and

FIG. 8 is a partial cross-sectional view of a cylinder to be cleaned and a soaked on site cleaning system according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. 1A and 1B, a cleaning fabric supply roll **10** used with the present invention is shown. One embodiment, shown in FIG. 1A comprises an elongated core **11** made from, for example, relatively heavy cardboard of sufficient strength so that it can support thereon a strip of cleaning

fabric **13**. The strip of cleaning fabric **13** is wound around core **11**. Alternatively, if desired, the core **11** can be made from any other suitable material including, but not limited to, plastic or metal, such as steel, aluminum, and the like. Core **11** preferably has open ends to allow installation on an appropriate cylinder cleaning apparatus. Preferably, core **11** is completely hollow to allow a shaft, rod, or the like **15** to be inserted within core **11** to provide installation in the cylinder cleaning apparatus. In such an embodiment, cleaning fabric supply roll **10** comprises core **11** and strip of cleaning fabric **13**. In an alternate embodiment shown in FIG. 1B, cleaning fabric supply roll **10** is formed by winding the strip of cleaning fabric **13** directly around shaft **15**. Preferably, the core **11** and/or shaft **15** is cylindrical in shape. However, the core **11** and/or shaft **15** may be any other appropriate shape, such as having 3, 4, 5, or 6 sides or an oval. Such shapes are described in concurrently filed application entitled "MOUNTING MECHANISMS FOR CLOTH ROLLS ON PRESS CYLINDER CLEANING DEVICES," an application filed by applicant C. Robert Gasparrini and commonly assigned, hereby incorporated by reference.

The strip of cleaning fabric **11** from which the cleaning fabric supply roll **10** is made may vary widely. For example, it may be made of paper, cloth, film, a mixture of wood pulp and polyester, such as DuPont SONTARA, or any other suitable material. In those cases where a cloth fabric is employed, it

may be a woven or non-woven cloth fabric made of synthetic or natural fibers or mixtures of the same. Exemplative, but not limitative, of suitable synthetic fibers which may be used in the cloth fabrics are polyester fibers, rayon fibers, nylon fibers, and acrylic fibers and the like. Exemplative, but not limitative, of the natural fibers which may be employed are cotton fibers, wood pulp fiber, hemp fibers and the like.

In those cases where paper is employed as the fabric material, paper fabrics made from wood pulp modified chemically in accordance with paper manufacturing technology are suitable.

On the other hand, no matter what fabric is employed in carrying out the practice of this invention, it is preferred that the materials used therein exhibit high acceptability to being soaked or wetted by a solvent or cleaning agent. Preferably, this solvent or cleaning agent is a low volatility organic compound used to saturate the fabric. In this regard, it is preferred that the fabric employed be one which has a caliper thickness in a range from about 0.003 inches to about 0.030 inches, and preferably in a range from about 0.008 inches to about 0.020 inches, and the ability, when saturated with low volatility organic compound solvent, to retain from about 0.02 cc to about 0.5 cc of solvent per in^2 of fabric determined by routine testing methods.

In general, woven and non-woven fabrics suitable for use in carrying out the practice of the invention have a basic

weight in a range of from about 1.5 ounces per square yard to about 6.0 ounces per square yard, a caliper thickness in the range mentioned above, a tensile strength in the longitudinal (machine) direction in a range of from about 20 lbs. per inch to about 200 lbs. per inch and in a width (cross) direction in a range from about 15 lbs. per inch to about 125 lbs. per inch.

When paper is employed as a cleaning fabric in the system of this invention, it preferably has a basis weight in a range of from about 40 lbs. to about 90 lbs., a caliper thickness in a range of from about 0.003 inches to about 0.10 inches, a tensile strength in the longitudinal (machine) direction in a range of from about 20 lbs. per inch to about 80 lbs. per inch and in the width (cross) direction in a range of from about 15 lbs. per inch to about 50 lbs. per inch, a porosity in a range of from about 1.0 second to about 10 seconds when subjected to 100 cc of low volatility organic compound solvent or water, and a stretch ability in a range of from about 1.0 percent to about 6.0 percent all determined by routine testing methods.

The low volatility organic compound solvent **20** employed in carrying out the practice of this invention may vary widely and generally it includes at least one low vitality organic compound solvent which does not readily evaporate, as well as mixtures of the same with similar low volatile organic compound solvents or with normally volatile organic compound solvents. Exemplative, but not limitative, of suitable solvent materials of

this type are organic compound solvents selected from vegetable oils and citrus oils and the like. Generally, such solvent materials have a volatility in a range of from about zero up to about 30.0 percent, and preferably a volatility in a range of from about zero percent to about 20.0 percent, determined by routine testing methods. It is to be understood that within the purview of this invention, such suitable solvents also include normally volatile organic compound solvents, that is, those which readily evaporate and which are selected from mineral spirits and aliphatic hydrocarbon solvents and the like. Such solvent materials generally have a volatility of from zero up to about 100 percent determined by routine testing methods. Preferably, a low volatility solvent will be used because the lower the volatility of the solvent, the longer the fabric stays wet since less solvent evaporates. The closer the volatility is to zero percent, the longer the life of the presoaked fabric on the printing press cylinder cleaning apparatus

It is to be understood that within the context of this invention, the terminology "saturated to equilibrium" as it is used in connection with the saturation of the fabric and/or fabric roll with solvent means by measured absorption or after removing the excess solvent from the fabric and/or fabric roll, the fabric and/or fabric roll retains therein sufficient solvent or cleaning agent in an amount to wet the fabric to the extent that it imparts efficient cleaning ability to the fabric to clean

cylinders of apparatus, such as printing machinery, and the fabric has preferably retained therein by measured absorption or after removal of the excess, if any removal is required, from about 0.02 cc to about 0.5 cc of solvent per in^2 of fabric.

The above described cleaning fabric supply roll **10** and low volatility, organic compound solvent **20** may be used in either a soak on press assembly or a soak on site system.

A soak on press assembly **1** is shown in FIG. 2. Soak on press assembly **1** is a cleaning apparatus mounted on a printing press (not shown) to prepare a strip of cleaning fabric to clean a cylinder **100**. A mounting assembly **30** is affixed to the printing press and supports the soak on press assembly **1**. Mounting assembly **30** may be a unitary structure. Alternatively, mounting assembly **30** may comprise several discrete pieces which are individually used to attach elements of the soak on press assembly **1** to the printing press. In yet a third embodiment, the mounting assembly **30** comprises those elements of a printing press which supports elements of the soak on press assembly **1**.

Cleaning fabric supply roll **10** is preferably rotatably mounted to mounting assembly **1**.

A container **42** is used to store solvent **20** while strip of cleaning fabric **13** is soaked and saturated in solvent **20**. In one embodiment, the container **42** is in engagement with a mounting assembly **30**. In an alternate, container **42** is placed in a duct **32** of mounting assembly **30**. In another embodiment, container **42**

is a duct **32** of mounting assembly **30**. Preferably, container **42** is removably connected to mounting assembly **30** to allow container **42** to be easily cleaned and solvent **20** easily replaced.

Cleaning fabric supply roll **10** needs to be placed in contact with the solvent **20** so that strip of cleaning fabric **13** my be soaked and saturated. One method of achieving this result is to dip all cleaning fabric supply roll **10** into solvent **20** contained in container **42**. For purposes of this invention, cleaning fabric supply roll **10** includes only the portion of strip of fabric **13** wrapped around core **11** and/or shaft **15** and not the portion of strip of cleaning fabric **13** threaded through the rest of the soak on press assembly **1**. Preferably, cleaning fabric supply roll **10** is dipped in solvent **20** and strip of cleaning fabric **13** is soaked and saturated with solvent prior to any portion of strip of cleaning fabric **13** being threaded through the rest of soak on press assembly **1**. Alternatively, a portion of strip of cleaning fabric **13** may be unwound from cleaning fabric supply roll **10** prior to cleaning fabric supply roll **10** being brought in contact with the solvent **20**. After the strip of cleaning fabric **13** of cleaning fabric supply roll **10** has been soaked and saturated, all of cleaning fabric supply roll **10** may remain in solvent **20**, a portion of cleaning fabric supply roll **10** may be removed from solvent **20**, or all of cleaning fabric supply roll **10** may be removed from solvent **20**.

In an alternate embodiment, only a portion, but at

least half, of cleaning fabric supply roll **10** is brought in contact with solvent **20** and remains in contact during operation of the printing press. The unwinding of cleaning fabric supply roll **10** causes cleaning fabric supply roll **10** to rotate and the strip of cleaning fabric **13** wrapped around core **11** and/or shaft **15** that was not in contact with the solvent **20** is placed in solvent **20** and allowed to soak and saturate.

In order for maximum efficiency, the strip of cleaning fabric **13** after it has been removed from cleaning fabric supply roll **10** should be in functional equilibrium with solvent **20**. Preferably, this is achieved through measured absorption of solvent **20**. Alternatively, excess solvent strip of cleaning fabric **13** can be removed by any appropriate means to obtain a strip of cleaning fabric **13** saturated to functional equilibrium with solvent **20**.

One way of removing excess solvent from a strip of cleaning fabric **13** is to use a squeezer **50** to squeeze out excess solvent. In one embodiment, squeezer **50** may comprise at least a pair of rollers with a gap between them. The strip of cleaning fabric **13** is placed between the rollers and the excess solvent is squeezed from the strip of cleaning fabric **13**. By controlling the size of the gap between the at least two rollers, the amount of excess solvent removed is controlled and regulated. In an alternate embodiment, squeezer **50** may comprise a squeezing roller **52**, which is rotatably mounted, and a squeezing surface **54**.

Squeezing roller **52** is disposed so that it is not engaged with squeezing surface **54** and a gap is formed between squeezing surface **54** and squeezing roller **52**. Squeezing roller **52** is preferably in a movedly fixed relationship with squeezing surface **54** such that squeezing rollers **52** in its position to facilitate the removal of excess solvent yet may be moved to change the size of the gap between surface **54** and roller **52** to control and regulate the amount of solvent being removed from the strip of cleaning fabric **13**. If squeezing roller **52** is movably mounted, it may be place adjacent to squeezing surface **54**.

As with container **42**, container **44** may be engaged with mounting assembly **30**, may be placed within a duct **34** of mounting assembly **30**, may be duct **34** of mounting assembly **30**, or any combination of the above. Additionally, any other type of container **44** may be used. Preferably, surface **54** is an element of container **44**. Alternatively, squeezing surface **54** may be a surface of mounting assembly **30**.

It is preferred that after the removal of excess solvent, the strip of cleaning fabric **13** is saturated to functional equilibrium with solvent. A cylinder cleaning means is used to bring the strip of cleaning fabric **13** in contact with a cylinder to be cleaned and causes the cylinder **100** to be cleaned. Examples of cylinder cleaning means can be found in United States Patent Application 07/955,694 filed October 2, 1992 by Harold W. Gegenheimer et al. entitled "AUTOMATIC CLEANING

SYSTEM FOR PRESS ROLLERS AND CYLINDERS", United States Patent No. 4,867,064 issued September 19, 1989 to Hara et al. entitled "APPARATUS FOR CLEANING A PRINTING CYLINDER", and United States Patent No. 5,150,653 issued September 29, 1992 to Hara entitled "METHOD OF AND APPARATUS FOR CLEANING A CYLINDER", all of which are hereby, incorporated by reference.

After being used to clean cylinder **100**, the used portion of the strip of cleaning cloth **13** is taken up by a take-up means **70**. Preferably, take-up means **70** is a take-up shaft **72** rotatably mounted to mounting assembly **70**. A take-up roll is formed by winding the used strip of cleaning fabric **13** around the take-up shaft **72**. Examples of take-up shaft **72** can be found in concurrently filed application entitled "MOUNTING MECHANISMS FOR CLOTH ROLLS ON PRESS CYLINDER CLEANING DEVICES," an application filed by applicant C. Robert Gasparrini and commonly assigned, hereby incorporated by reference.

FIG. 3 demonstrates an alternate embodiment of the invention. In this embodiment, cleaning cloth supply roll **10** is not soaked and saturated in solvent **20**. Instead, the strip of cleaning fabric **13** is at least partially removed from the cleaning cloth supply roll **10**. A soaking means **80** is used for soaking and saturating at least a portion of the strip of cleaning fabric **13** in solvent **20**. In this embodiment, the soaking means **80** includes a dipper **82** and a container **42**. Container **42** is used to store the solvent while dipper **82** is

placed at least partially in the solvent **20**. Dipper **82** is used to place the at least a portion of the strip of cleaning fabric **13** in solvent **20** and to allow the strip of cleaning fabric **13** to soak and saturate in the solvent **20**. Preferably, dipper **82** is a roller rotatably mounted to the mounting assembly; however, any appropriate dipper may be used. The remainder of the soak on press assembly **1** functions the same as that described for the device shown in FIG. 2.

An improved embodiment of the invention is shown in FIG. 4. In this embodiment, instead of having a solvent storage container **42** and a removed excess solvent storage container **44**, only a single storage container **46** is used. Because the removed excess solvent can be used immediately without the need to move it from one container **44** to a second container **42**, the soak on press assembly **1** can be operated for a longer period of time before the container needs to be cleaned and/or refilled.

As with containers **42** and **44**, container **46** may be constructed in a variety of fashions. For example, container **46** may be fixed, either permanently or, preferably, removably, to mounting assembly **30**. Container **46** may be placed or fixed within a duct **36** of mounting assembly **30**. Alternatively, duct **36** may be used at the container. On the other hand, any combination of the above may be used. For example, container **46** may comprise a container placed within a duct and having the duct extend beyond the container. Alternatively, any other appropriate construction

of container **46** may be used.

In another embodiment, multiple containers **46** are used. In each of these containers **46**, the strip of cleaning fabric **13** is both soaked and saturated with solvent **20** and excess solvent is removed from the soaked and saturated strip of cleaning fabric **13**.

Figure 5 an improvement to the single container embodiment described above, a single body **90** is used to both dip the strip of cleaning fabric into solvent **20** stored in container **46** to allow the strip of cleaning fabric **13** to soak and saturate in the solvent and to remove the excess solvent by squeezing the soaked and saturated strip of cleaning fabric **13** between the body **90** and squeezing surface **54**. Preferably, body **90** is a roller which is rotatably mounted to mounting assembly **30**. In this embodiment, body **90** may be mounted to allow movement relative to surface **54** to control and regulate the amount of excess solvent being removed.

An alternate approach to achieving the advantages of the invention is to presoak the strip of cleaning cloth **13** on site, that is near enough to the press that the presoaked cleaning cloth can be brought to or in the proximity of the press containing the cylinder to be cleaned without disposing a sealed and/or heat-sealed plastic sleeve about the cleaning fabric roll **10** and without substantially disturbing the distribution of the solvent in the fabric roll and detrimentally affecting the

cleaning ability of the fabric.

In accordance with a method of this invention, a strip of cleaning fabric **13** is brought in contact with a low viscosity, organic compound solvent which does not readily evaporate at ambient pressure and temperature. Contact between the strip of cleaning fabric **13** and the solvent **20** may be achieved in a variety of ways. For example, solvent may be applied in measured amounts so that the fabric is presoaked to functional equilibrium. This preferred method of applying solvent is known as measured absorption of a solvent. If desired, instead of measured absorption, an excess amount of solvent may be applied to the strip of cleaning fabric. This may be done by soaking and saturating the strip of cleaning fabric in a vat of solvent. If this is done, the excess solvent must be removed to obtain a strip of cleaning fabric saturated to functional equilibrium with the solvent. Any appropriate method for removing the excess solvent to obtain a strip of cleaning fabric saturated to functional equilibrium can be used with any of the above methods of contacting, including draining the strip of cleaning fabric or spinning the strip of cleaning fabric. The strip of cleaning fabric is presoaked and saturated with a low volatility, organic compound solvent before or after the strip of cleaning fabric **13** is wound to form a cleaning fabric supply roll **10**.

An alternative embodiment of a method of presoaking a strip of cleaning fabric on site is shown in FIG. 6. A strip of

cleaning fabric **13** is initially wound around a shaft or core **115** to form bulk roll **110**. Bulk roll **110** is rotatably mounted to a roll forming assembly. The amount of fabric on bulk roll **110** may be sufficient to form multiple cleaning fabric rolls **10**. A portion of the strip of cleaning fabric **13** is unwound from bulk roll **110**. If desired, at least a pair of calendering rollers **150** may be used to calender the strip of cleaning fabric **13**. The at least a pair of calendering rollers **150** compress the strip of cleaning fabric **13**. Preferably, but not necessarily, the temperature of the at least a pair of rollers **150** is hotter than room temperature. Alternatively, the temperature of the at least a pair of rollers **150** is at about ambient temperature or less than ambient temperature. It has been found that the wettability and the distribution of the solvent is very good in the calenderized fabric.

A surprising and unexpected result of the calendaring process is that the length of fabric is increased while not increasing the diameter of the cleaning fabric supply roll **10**. This provides an important advantage because cleaners are designed to accept fabric rolls of up to a certain diameter. For example, one of the assignor's automatic blanket cleaners will only accept a cleaning fabric roll having a diameter of about 2.75 inches. Because of this extra length, a fabric roll of calenderized cloth will be usable for more washes than a regular fabric roll of the same fabric having the same diameter. This

has two advantages. First, the cost per wash will be reduced. Second, the pressmen need not change a roll of cleaning fabric as often since there are more washes per roll of cloth. This will allow for the press to be run more often. These advantages can be realized regardless of whether the fabric is pre-soaked and/or pre-packaged.

The amount of increase in the length of cloth due to calendaring is dependent on the fabric used and the amount of calendaring. For example when DuPont SONTARA cloth having a thickness of about .012 inches and a length of about 12 yards is placed about a core, having a diameter of about 1.5 inches, the fabric roll has a diameter of 2.75 inches. After being calendered the cloth has a thickness of about 0.0085 inches and a length of about 16 yards and still has a diameter of about 2.75 inches when placed on the same core. Thus, in this situation, calendering results in an about 25% to about 30% increase in the length of the fabric without increasing the diameter of cleaning fabric supply roll **10**. Depending on the type of fabric and amount of calendering, results may range from about a 10% increase to about a 50% increase.

Calendaring fabric and its advantages are discussed in more detail in the United States Patent Application by C. Robert Gasparrini and Walter H. Cano entitled "CLEANING SYSTEM AND PROCESS FOR MAKING SAME EMPLOYING REDUCED AIR CLEANING FABRIC" filed concurrently herewith and hereby incorporated by reference.

A solvent application system **120** is used to apply a measured amount of solvent **20** to the strip of cleaning fabric **13**. A container **122** is used to store solvent **20**. A solvent supply roller **124**, which is rotatably mounted, is partially submerged in solvent **20**. A rotatably mounted application roller **126** is positioned adjacent to and in contact with the solvent supply roller **124** at a portion of the solvent supply roller **124** which is not submerged in the solvent **20**. Solvent supply roller **124** and application roller **126** are rotatably mounted such that they rotate in the opposite direction. The rotation of solvent supply roller **124** and application roller **126** cause solvent **20** to transfer from solvent supply roller **124** to application roller **126** via nip **125**. If desired, a plurality of solvent supply rollers **126** may be used to transport solvent **20** from container **122** to the application roller **126**. In such an embodiment, the plurality of solvent supply rollers **124** are adjacent to and in contact with each other to form a chain of rollers such that one solvent supply roller **124** is submerged in solvent **20** and another solvent supply roller **124** is in contact and adjacent to application roller **126**. The strip of cleaning fabric **13** is placed between and adjacent to a rotating roller **128** and application roller **126**. The rotation application roller **126** causes a measured amount of solvent **20** to be placed in contact with the strip of cleaning fabric **13** and allowing the fabric **13** to be soaked and saturated with the solvent **20**. Preferably, the strip of cleaning fabric **13**

is soaked and saturated to functional equilibrium with the solvent **20**. Alternatively, an excess amount of solvent may be used to soak and saturate the strip of cleaning fabric **13**. Such excess solvent can be removed by any appropriate means including, but not limited to, running the strip of fabric **13** through at least a pair of rollers **160**. The soaked and saturated strip of cleaning fabric **13** is then wound around a core, shaft or any other appropriate body to form a cleaning fabric supply roll **10**. The excess solvent, if any is applied to the fabric, may be removed either before or after the cleaning fabric supply roll **10** is formed. When a cleaning fabric supply roll **10** of an appropriate diameter is formed, the strip of cleaning fabric **13** is cut or torn, cleaning fabric supply roll **10** is removed, and a new shaft or core is used to form another cleaning fabric supply roll.

In the above described system, the winding of the strip of cleaning fabric **13** into a cleaning fabric supply roll **10** may cause the strip of cleaning fabric **13** to move through the solvent application system **120**, the at least a pair of calendering rollers **150** (if used) and the pair of rollers **160** (if used).

The solvent application system **120** including all its elements, calendaring rollers **150**, pair of rollers **160**, and cleaning fabric supply roll **10** may all be attached to a roll forming assembly.

A soak on site system using an alternate solvent

application system **170** is shown in FIG. 7. At least one placement device **174**, preferably a roller, is used to place the strip of cleaning fabric **13** above a container **172** storing a low volatility, organic compound solvent **20** which does not readily evaporate at ambient pressure and temperature. A dipper **176**, preferably a rotatably mounted roller, is used to dip the strip of cleaning fabric **13** into the solvent **20**. This allows the strip of cleaning fabric **13** to soak and saturate in the solvent **20**. Preferably, the strip of cleaning fabric **13** is soaked and saturated to functional equilibrium with solvent when it is removed from solvent **20**. If not, the excess solvent must be removed. Any appropriate method for removing excess solvent may be used. Preferably, the excess solvent is removed by squeezing the strip of cleaning fabric **13** between a pair of rollers **160**.

Yet another possible embodiment is shown in figure 7A. In this embodiment, the solvent application system **180** includes a container **182** a dipping roller **184** and a squeezing roller **186**. Solvent or cleaning agent **20** is stored in container **182**. The dipping roller **184** is used to dip the strip of cleaning fabric **13** into the solvent or cleaning agent **20**. The strip of cleaning fabric **13** is soaked and saturated in the solvent or cleaning agent **20**. The strip of cleaning fabric **13** is then removed from the solvent and the excess solvent is removed form the strip of cleaning fabric **13** so that it is saturated to functional equilibrium with the solvent **20**. This removal may be

accomplished by squeezing the strip of cleaning fabric **13** between dipping roller **184** and squeezing roller **184** at a point above solvent **20**. An advantage of such a system is that the removed excess solvent will drop into container **182** and thus a separate container for the removed excess solvent will not be required.

Also shown in figure 7A is a positioner **190**. Positioner **190** is preferably a roller. Positioner **190** may be used to properly position the strip of cleaning fabric **13** is presoaked. Although positioner **190** is only shown in figure 7A, a positioner may be used in any embodiment of the invention. Positioners may also be used in the soak on press systems described earlier.

It should be noted that the embodiments shown in figures 6, 7, and 7A do not need to have rolls **150** installed. If rolls **150** are not installed, standard uncalendered fabric is used and less solvent stability is obtained.

After being presoaked on site, the cleaning fabric supply roll **10** having a strip of cleaning fabric **13** is then placed on a printing press having a cylinder **100** to be cleaned.

The printing press further includes a means for properly positioning the cleaning fabric to allow cleaning of the cylinder **100**. Several ways exist for this result to be achieved. For example, the cleaning fabric **13** may be positioned so that it is adjacent the cylinder **100** to be cleaned. In another example, the cleaning fabric **13** may be adjacent to and operatively

associated with the cylinder **100** to be cleaned. In yet another possible embodiment, the cleaning fabric **13** is operatively associated with the cylinder **100** to allow cleaning the cylinder **100** as the fabric **13** is fed past the cylinder **100**. One possible arrangement is shown in Fig. 8. The person of ordinary skill in the art will be aware of many other configurations that will work for the invention's intended purpose without undue experimentation. These examples are merely exemplary and are not meant to limit how the invention may be used.

A distinct advantage of the cleaning system of this invention is that it eliminates the need for complex apparatus, such as pumps, spray bars, manifold lines, valves and the like, especially as part of the automatic blanket cleaning systems used on printing machinery to introduce cleansing solvents or solutions to the cleaning fabric just prior to use.

In addition, the cleaning system of this invention provides numerous other advantages. For example, it is relatively simple in construction, employs readily available materials, and can be made in a relatively simple and forward manner without resort to highly complex and expensive procedures which necessitate the use of elaborate machinery. Additionally, the invention is preferable to the invention discussed in U.S. Patent No. 5,368,157 to Gasparrini et al. in that it provides for less solvent displacement during storage and thus less of a change in the fabric roll's center of gravity. Numerous other

advantages of this invention will be readily apparent to those skilled in the art.

It will remain understood by those skilled in the art that the present invention in its broader aspects is not limited to the particular embodiments shown and described herein, and that variations may be made which are within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.